STOCKPILE REPORT
to the Congress

January - June 1955

Pursuant to Section 4
of the
Strategic and Critical Materials
Stock Piling Act
Public Law 520, 79th Congress

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF DEFENSE MOBILIZATION
WASHINGTON 25, D. C.

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OFFICE OF THE DIRECTOR

September, 1955

The Honorable
The President of the Senate

The Honorable
The Speaker of the House of Representatives

Sirs:

There is presented herewith the semi-annual Report to the Congress on the Stockpiling Program in accordance with Section 4 of the Strategic and Critical Materials Stock Piling Act, Public Law 520, 79th Congress. This report covers the period from January 1 to June 30, 1955.

Sincerely yours,

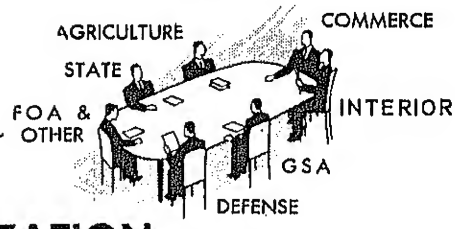
Arthur S. Flemming
Director

STOCKPILING

$10,400,000,000

STRATEGIC FACTORS

SUPPLY-DEMAND DATA PROGRAM



OFFICE OF DEFENSE MOBILIZATION

1. Establishes Defense Materials Policies and Programs
2. Determines Stockpile Materials
3. Sets Stockpile Objectives
4. Determines Purchase Programs

OPERATIONS

GENERAL SERVICES ADMINISTRATION

EMERGENCY PROCUREMENT SERVICE

BUYS OR ACQUIRES AND STORES STOCKPILE MATERIALS FROM:

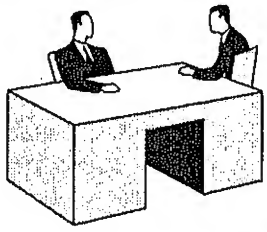
GOVERNMENT SOURCES

SUCH AS:

DEFENSE PRODUCTION ACT INVENTORIES

GOVERNMENT OWNED SURPLUSES

COMMODITY CREDIT CORPORATION
BARTER FOR AGRICULTURAL SURPLUSES



U. S. PRODUCERS AND IMPORTERS

INVENTORIES

		ON HAND	
OBJECTIVES	$10.4 Billion, Including $7.0 Billion minimum	5,600,000,000	22,500,000

6/30/55

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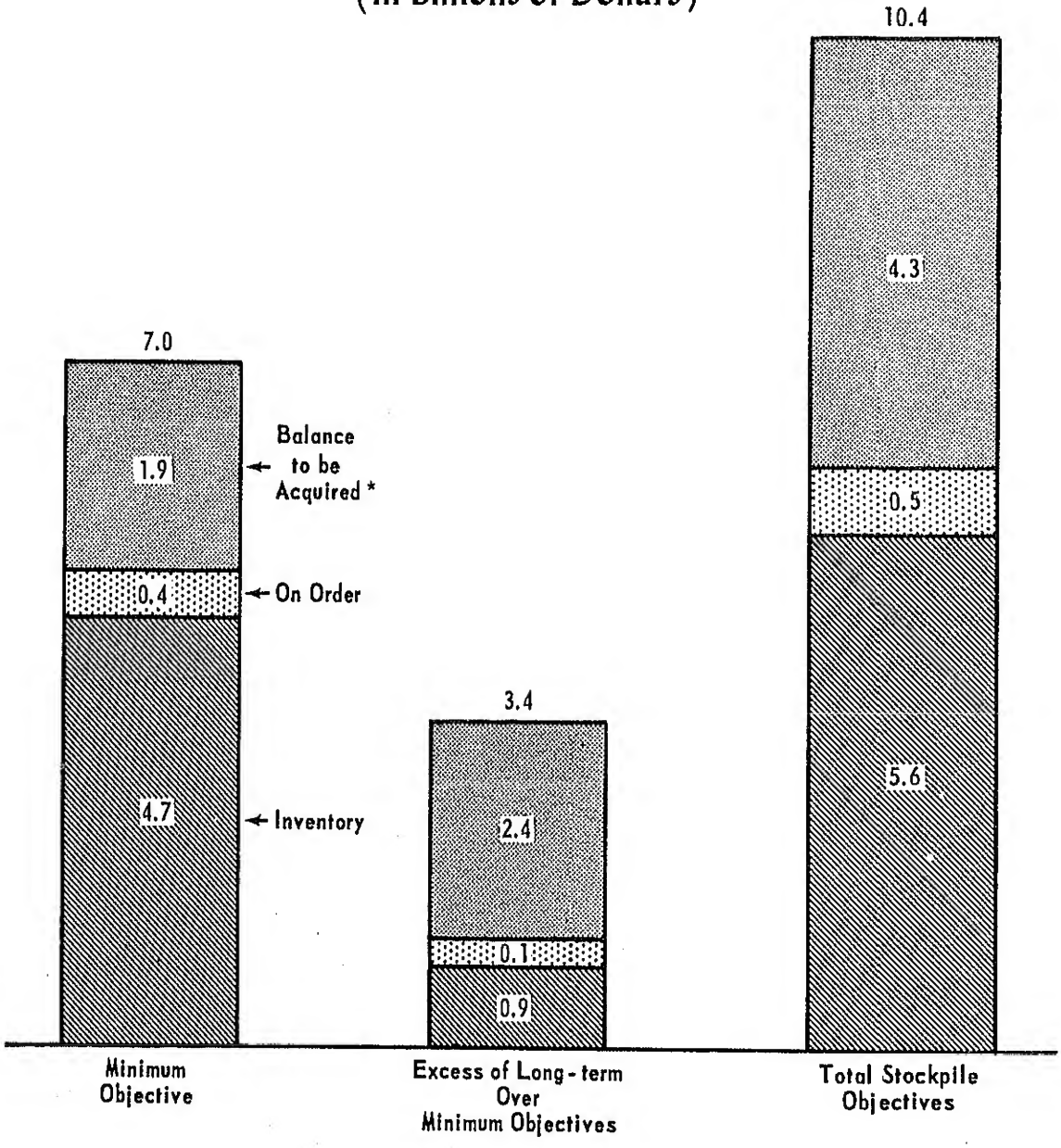
Chart I

STOCKPILE STATUS

(In Billions of Dollars)



* Does not take account of materials on hand or on order under Defense Production Act contracts.

Note: Levels of objectives and values based on market prices as of June 30, 1955

PROGRESS IN ACHIEVING MATERIALS SECURITY

STATUS OF THE STOCKPILE PROGRAM ON JUNE 30, 1955

General

The Government program to improve the defense position of the United States by stockpiling strategic and critical materials moved steadily forward toward the objective of eliminating the threat of shortages of imported materials in emergency. Seventy-five materials were being stockpiled during the six months, January-June 1955. (See Appendix B.) Acquisitions of materials for the stockpile during this period have been substantial, over a million tons of strategic and critical materials were delivered, and total stockpile purchases and transfers were valued at about $300 million.

These quantities were procured substantially from Defense Production Act inventories; however, open-market purchases and to a lesser extent Department of Agriculture barter transactions contributed to this total. During this six months, materials of stockpile grade acquired as a result of Defense Production Act expansion contracts totaled $215 million. Open-market purchases of stockpile materials totaled $40 million. Barter of agricultural surpluses added an additional $20 million worth of stockpile materials. An additional $25 million worth were acquired from surplus transfers, from deliveries under previously established foreign aid contracts, and from Customs Bureau or Narcotics Bureau seizures.

The Minimum Stockpile Program

As shown in Chart 1 on the opposite page, total minimum objectives are currently valued at about $7 billion, while inventories on June 30, 1955, were valued at about $4.7 billion. About $400 million worth of materials were on order for future delivery under existing stockpile contracts for filling minimum objectives. Consistent with past programs large quantities are expected to be delivered to the stockpile under existing Defense Production Act expansion contracts.

During the six months a total of $266 million worth of materials were added to the minimum stockpile. About 80% or $213 million worth of these purchases were materials transferred to the stockpile from Defense Production Act account as a result of deliveries under expansion contracts.

Chart 1 shows that by June 30, 1955, the total value of the 75 minimum stockpile objectives has increased from the past report. This increase is largely a result of increased rubber, copper and aluminum prices and higher stockpile objectives for certain materials.

Two significant developments during the period were the increased recognition of the importance of nuclear attack on potential materials security and the sharp increase in current industrial demand for aluminum, copper and nickel coupled with the decrease in copper supplies due to work stoppages. These three materials have been in such short supply that some anticipated Government deliveries have been deferred or canceled throughout the latter part of this report period and also during the third quarter of 1955.

Of the seventy-five materials being stockpiled, only about a half-dozen represent serious problems in achieving the desired degree of materials security. For these few materials several more years of stockpile procurement will be necessary. Additional expansion of supplies, revision of military specifications for end items and components or development of substitutes are being encouraged to expedite filling those objectives or to reduce dependence on these scarce materials. For the remainder of the stockpiled materials, the quantities on hand and on order together with estimated domestic production and imports are practically sufficient to provide for anticipated defense needs. Where the minimum objectives are close to being filled the rate of procurement is being tapered off so that withdrawal of stockpile purchases will be gradual and will have a minimum unsettling effect on the market.

The Long-Term Stockpile Program

The largest acquisitions under the long-term stockpile program involved lead and zinc in accordance with policies to help maintain the domestic production component of the mobilization base. In addition, met-

als and minerals of foreign origin were scheduled for later stockpile delivery in exchange for surplus agricultural commodities bartered by the Commodity Credit Corporation. Long-term stockpile program purchases during the six months totaled $33.5 million.

The long-term stockpile policy was established by the President on March 26, 1954, upon recommendation of the President's Cabinet Committee on Minerals Policy. This policy provides for security in materials additional to the minimum program through substantially higher objectives for stockpiled metals and minerals. The policy also authorizes the processing of stockpile inventories to forms that will be more readily usable in time of war.

When the minimum objective for a material has been reached, it is not necessary to complete the long-term objective as quickly. Consequently, it is expected that the acquisition of materials under the long-term policy will occur over a considerable period of time.

Open-market procurement toward the higher objectives and upgrading actions must be made at prices advantageous to the Government and under conditions that will assist in maintaining some essential component of materials preparedness. When open-market purchases are made under the long-term policy, preference is given to newly-mined domestic metals and minerals. The policy provides for crediting to the stockpile materials acquired under the Stock Piling Act beyond minimum objectives, and for transferring to the stockpile surplus materials acquired under the Defense Production Act and other Government programs. The exchange of agricultural commodities for strategic metals and minerals may also be used to complete the long-term objectives.

The Supplemental Stockpile

No strategic materials have been acquired for the supplemental stockpile, although agreements entered into by June 30, 1955, are expected to provide about $2.8 million worth. Under Title I of the Agricultural Trade Development and Assistance Act of 1954 strategic materials may be acquired for a "supplemental stockpile" with foreign currencies acquired by the United States through the sale of surplus agricultural commodities. This stockpile is above and beyond the national stockpile including the minimum and long-term stockpiles.

OTHER SIGNIFICANT ACTIVITIES

Review of Stockpile Objectives

During the first six months of this year stockpile reviews were completed for 17 materials, resulting in the following actions: (a) increased objectives for nine materials, (b) decreased objectives for five, (c) a reaffirmed objective for one, (d) the addition of one material to the List of Strategic and Critical Materials for Stockpiling and the removal of another material from that list. By June 30, 1955, approximately 25 additional reviews were under way.

Barter Procurement

Expansion of the Department of Agriculture program to exchange agricultural commodities owned by the Commodity Credit Corporation for strategic and critical materials continued at an accelerated rate during the first six months of 1955, as barter contracts were negotiated calling for deliveries valued at approximately $185 million.

Under barter contracts negotiated during the fiscal year July 1, 1954, through June 30, 1955, the Commodity Credit Corporation has either delivered or is obligated to deliver to foreign countries its agricultural commodities valued at approximately $280 million. About 90% of this amount has been exchanged for strategic materials which may be transferred into stockpile inventories.

Storage and Maintenance

As of June 30, 1955, strategic and critical materials in the national stockpile were stored at 273 locations, as follows:

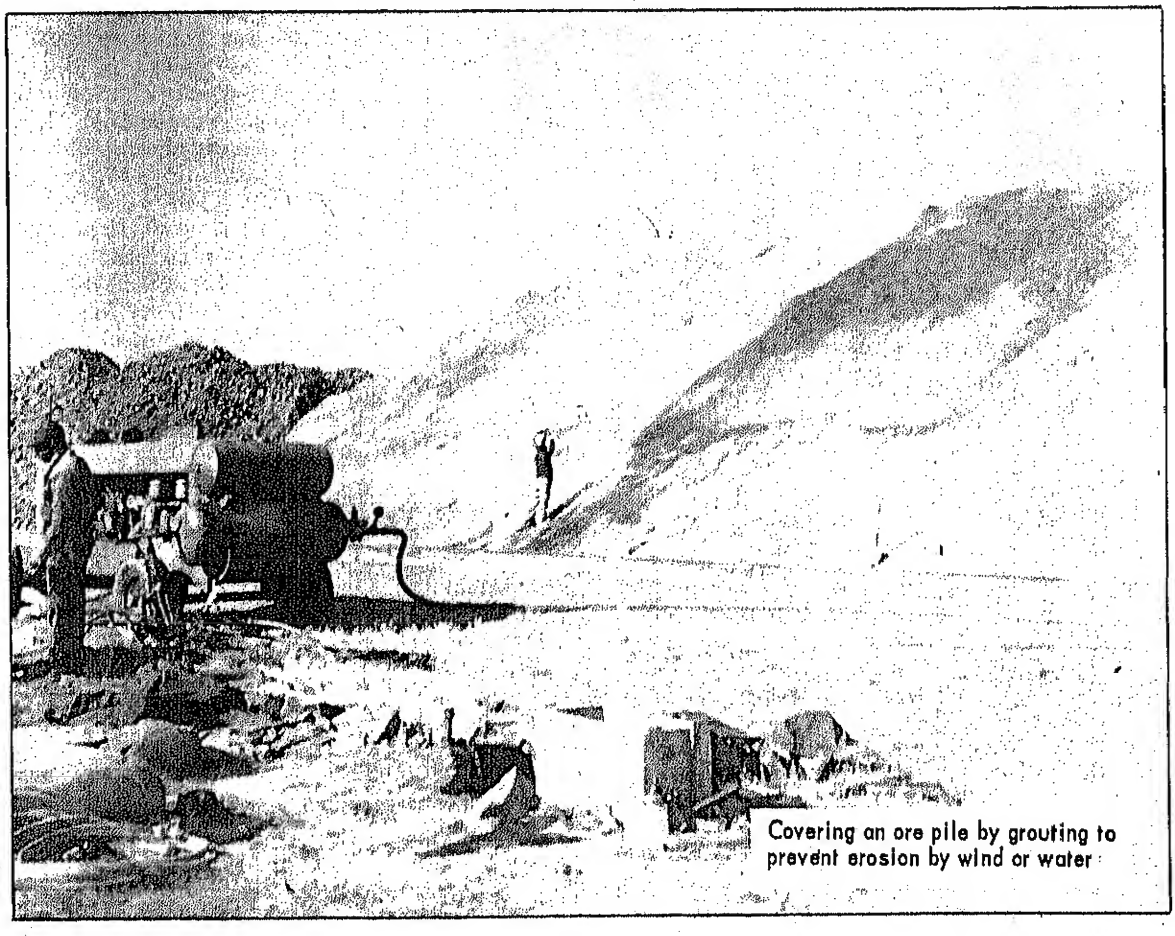
65	Military depots
16	General Services Administration warehouses
5	Vaults
4	Other Government-owned sites for bulk ores
125	Commercial warehouses for other than bulk ores and oils
16	Commercial locations at which stockpiled oils are stored in tanks
11	Leased commercial sites for bulk ores
31	Industrial plant-site locations
273	Total

During the six months period the number of storage locations was reduced by 21 sites primarily by eliminating commercial storage locations and warehouses and replacing them with larger Government owned sites, some obtained by utilization of surplus military facilities. Four additional industrial plant site locations were established in furtherance of the policy of storing heavy tonnage, indestructible stockpiles as close to potential emergency period industrial consumers as security factors permit.

Several other important stockpile administration activities were undertaken. About 96,500 tons of combustible materials were either transferred from sub-standard warehouses to Government installations or sold under rotation programs. Four stockpile vegetable oil tank farms are filled and the fifth is receiving oils from commercial storage facilities, which are being discontinued, at the rate of about 190 tank cars a month. During this six months 65 million pounds of stockpiled oils were transported into these Government tank farms. Also, to protect some ore piles from wind and water erosion, over 100,000 square feet of such piles were covered by grouting with a mixture of cement and the stockpiled material.

Research and Development

The Stock Piling Act authorizes and directs the Departments of the Interior and Agriculture to make scientific, technological, and economic investigations with respect to stockpile materials. Exploration and development are also authorized by the Defense Production Act of 1950. The major research activities of the Government on defense materials have been reviewed in detail in previous reports. Developments or research results during the past six months are included in Part II. The United States Geological Survey project reports that were completed and published during the period January 1 to June 30, 1955, are shown in Appendix C.



Covering an ore pile by grouting to prevent erosion by wind or water

STOCKPILE MATERIALS OF GENERAL INTEREST

ALUMINUM

The Government sponsored aluminum expansion program, started in 1950, has come to maturity with an output more than double the pre-Korean production. This expanded output has not only greatly strengthened the Nation's defense position by broadening the mobilization base of aluminum production for a possible emergency and by permitting the accumulation of a still growing stockpile of the metal, but also has made possible an unprecedented growth in the civilian use of aluminum.

The planned expansion of the aluminum industry in the past few years represents a sharp departure from the forced growth of World War II when output was greatly expanded, often without regard to cost wherever power could be made available. That expansion raised output from 309,067 tons in 1941 to 920,179 tons in 1944. Thereafter, with the immediate war needs satisfied, production dropped and most of the uneconomic facilities were dismantled.

The new facilities brought into production under the current expansion program stand as permanent additions to the Nation's productive resources. An effective stockpiling program is being administered while a rapidly expanding civilian demand for aluminum is being met. Aluminum production has increased from 718,622 tons in 1950 to 1,460,565 tons in 1954. In the first half of 1955 output amounted to 759,867 tons, an increase running 6% ahead of 1954 and more than the entire 1950 production.

The Government has encouraged this expansion by use of tax amortization, by contracts to purchase the output of new potlines should producers be unable to find a market, and in one instance by a Government guarantee of a private loan financing a reduction plant.

To offset the critical supply shortage arising from the Korean conflict, the Government also subsidized production from high cost facilities and made arrangements for imports to supplement domestic production. Even so, aluminum was a controlled material under full Government allocation from producer to ultimate user. With emergency demands at their height, and with the expansion program still in the construction stage, little progress could be made in the Korean period toward filling the stockpile.

However, by 1953 immediate military needs for aluminum decreased, imports increased, and some new facilities began production. With this improvement in supply, controls were relaxed. Consumers entered a new growth period with constantly mounting demands for the metal both for the older established uses such as foil and piston metal, as well as for many new uses from automatic transmissions to lawn furniture.

Although the expansion program had entailed agreement on the part of the Government to buy aluminum for which producers could find no market, the growth of demand precluded any problem of overburdening surpluses. The quantities withdrawn to make additions to the stockpile were carefully adjusted to avoid any possible tightening effect on the supply available for industrial needs. Some stockpile additions became possible in 1953. Substantial quantities were procured in 1954. As 1955 advanced, it appeared desirable to limit new stockpile additions to lesser amounts than had been previously planned and this was done, consistent with the maintenance of a strong defense position. Expanded demand, fired by heightened economic activity and a desire to rebuild business inventories tightened the supply situation. As a result of study incorporating the advice of both industry and the Department of Commerce and with the advice of the Defense Mobilization Board, stockpile procurement schedules were reduced by 25,000 tons for the first quarter and by 50,000 tons for the second quarter. Delivery dates for the actual amounts to be acquired for the stockpile also were deferred beyond the closing dates of each quarter as a means of further easing the demand on primary producers.

The fact that such steps could be taken demonstrate how the Nation's situation in aluminum has been vastly strengthened com-

pared with a few years earlier. Current production now available affords a much greater volume of metal that can be diverted to defense purposes if needed. At the same time, the fact that such production is available tends to diminish but by no means to eliminate the necessity for an aluminum stockpile.

The national stockpile for aluminum although not filled provides much of the needed additional security for potential wartime needs. Of course, the primary resource for meeting potential wartime requirements is the existing production capacity which has grown so fast and gives promise of continued growth.

Meanwhile, the number of producers of prime aluminum has been increasing. From one producer before World War II, the number increased to three by the time of the Korean outbreak. Now, a fourth company participating in the Government's expansion program has commenced production of metal in a new plant. Also, established operators and others new to the field are manifesting interest in expanding aluminum production. Any capacity which may materialize from such plans would further broaden the production base.

COPPER

Soon after the start of Korean hostilities, the need for expanding United States copper supplies to a level of 2,270,000 tons of copper per year became apparent. Expansion projects were encouraged and developed, largely by Government purchase contracts which guaranteed the producer a floor price and gave the Government call rights on the expanded production. These projects provided for the ultimate addition of over 300,000 tons of annual productive capacity to the United States supply. These expansion projects will account for about 175,000 tons of new supply in 1955 with large additional increases scheduled for 1956. The Government's call rights on these projects have not been exercised up to the present; instead, the Government has been allowing the copper to flow to industry to meet industrial demand.

Because of shortages resulting from increased industrial activity and work stoppages in copper production, beginning with the fourth quarter of 1954 the Office of Defense Mobilization, at the request of the Department of Commerce and with the advice of the Defense Mobilization Board, authorized the deferral of contract deliveries both to the stockpile and to the Defense Production Act inventory so that the copper so deferred might be diverted to industrial use. In addition, copper in Defense Production Act inventories was released to industry in October 1954 and in February 1955.

The copper thus made available was distributed on the basis of hardship at the direction of the Copper Division, Business and Defense Services Administration, Department of Commerce. Between October 16 and December 31, 1954, the Emergency Procurement Service, in accordance with Office of Defense Mobilization policy and at the direction of the Business and Defense Services Administration, sold 19,007 tons of copper from Defense Production Act inventories, and amended stockpile and Defense Production Act contracts to defer delivery of 17,863 tons to the stockpile and 1,877 tons to Defense Production Act inventories so that these quantities could be diverted to industrial use in the United States. An additional 2,600 tons were diverted to Canadian use.

By the turn of the year, United States refinery production had returned to full-scale operation and although new supplies from domestic sources were improving, imports decreased and exports increased, while domestic industrial demands were higher than ever. In net balance the United States was still in short supply. By late February it was evident that additional Government assistance was necessary to relieve pressures of industrial demand and approximately 7,000 tons were sold from Defense Production Act inventories. Scheduled stockpile deliveries were not disturbed at this time.

Further assistance to industry was provided for the second and third quarters of 1955, when previous deferments were extended and deliveries to Defense Production Act and stockpile inventories were deferred, again at the direction of the Copper Division, Business and Defense Services Administration. Total diversions to industry during the second quarter of 1955 amounted to 3,000 tons deferred from delivery to the Defense Production Act inventory and 7,300 tons deferred from delivery to the stockpile.

Experience under the several programs for the diversion of copper to industry under Governmental direction has shown that piecemeal attempts to direct the distribu-

tion of copper involve the Government in a number of problems which should be within the province of private industry except in critical defense or other national emergencies. These complications arose even though the quantity of copper that could be made available to industry by such diversions was only a minor share of the total supply.

In time of full mobilization the national economy is substantially reoriented to production for war, and in such circumstances the Government must take increased responsibility. At the present time there is no such disruption of markets and supplies as occurs in time of war. Consequently, Government controls cannot be justified by the fact that defense requirements have created a shortage. Consideration must first be given to other less drastic measures. Accordingly, on May 27, the Director of the Office of Defense Mobilization requested the General Services Administration and the Department of Commerce to discontinue supervision of the distribution of copper being deferred and diverted to industry.

It is clear that the expansion of copper production under Government encouragement has contributed substantially to the alleviation of the copper supply shortage. This expansion also helps to enlarge the potential wartime supply of copper, thus reducing the urgency and magnitude of stockpiling. The stockpile, however, is still far from filled. As supplies increase and as the market adjusts to these temporary supply problems, stockpile purchases will be resumed. Meanwhile, industry is receiving larger quantities of copper from Government expansion programs which would not have been available if these Government programs had not been in effect.

LEAD AND ZINC

During 1953 and the early part of 1954 it became apparent that the survival of the domestic lead and zinc industries was being threatened. Unprecedented numbers of mines were closing and others were concentrating their operations on the better-grade reserves in an effort to continue production. Domestic mine production of lead and zinc by 1954 declined to the lowest level in 20 years despite the enormous expansion of industrial activity during the period. Since the domestic industry is regarded as an indispensable source of supply for an emergency period, the national security was being jeopardized.

This problem and certain other problems concerning other strategic and critical metals and minerals were becoming so serious that on October 26, 1953, the President established the President's Cabinet Committee on Minerals Policy to investigate them and to submit recommendations. Among its recommendations the Committee included one that long-term stockpile objectives for metals and minerals be established and that purchases be made against these objectives at such times as would help to maintain an adequate production component of the mobilization base.

Based on the President's endorsement of this recommendation, the Office of Defense Mobilization determined long-term stockpile objectives for lead and zinc, and in June 1954 began to purchase the metals against those objectives. The purchases were limited to metal derived from newly-mined domestic ores.

In August 1954, the President announced an expanded lead and zinc purchase program limited to newly-mined domestic material and stated that up to 200,000 tons of lead and up to 300,000 tons of zinc could be purchased in the fiscal year ending June 30, 1955.

Although both metals were subsequently purchased freely during the year, insufficient quantities were offered to the Government to exhaust the amount authorized for purchase by the end of the year. The Office of Defense Mobilization, therefore, announced that the program would be continued and stated that the unprocured balance against the long-term objectives would permit purchases of the metals to continue until the end of calendar year 1955, and, it would appear, throughout 1956.

The effect of the program has been to stabilize and strengthen the mobilization base in both industries. Production has increased and the price of lead has advanced from 12 1/2 cents per pound in February 1954 to 15 cents by June 30, 1955. The price of zinc has advanced from 9 1/4 cents per pound to 12 1/2 cents in the same period. Stocks of refined pig and antimonial lead at smelters declined from a peak of 109,000 tons at the end of May 1954 to 45,000 tons on June 30, 1955, and of zinc from 210,000 tons at the end of May 1954 to 51,000 tons also at the end of June 1955. Supply and demand of the metals, which were far out of balance, have been brought into balance. In recent months offers of the metals for Government procurement have declined sharply. The Gov-

ernment has consistently taken all that was tendered to it in fiscal year 1955. Thus, the program has aided greatly in the fiscal year 1955, for which it was originally established, and has ended the year with a sufficient unfilled balance against the objectives to permit continuation into the future, thereby helping to maintain domestic output and productive capacity.

MICA, MUSCOVITE BLOCK AND FILM

Mica of high electrical quality in the strategic grades is an extremely scarce material and the United States obtains the bulk of its supplies from imports. For this reason stockpiles of these materials—muscovite block and film mica—are necessary for use in an emergency. Because the minimum stockpile objectives for muscovite block and film mica are far from completed, various means of either increasing the supply or developing substitute or alternate materials are being investigated.

Since before World War II, muscovite mica has been on the strategic and critical materials stockpile list. During that war Government controls and allocations limited its use. Also many efforts have been made to expand supplies, to develop acceptable substitutes, or to reduce quality requirements so that more readily available lower grades of mica could be used.

In order to promote increased production domestically, the Defense Minerals Administration, in early 1951, initiated an expansion program which provides for Government depots in three locations where domestically-produced hand-cobbed mica is bought at prices which are substantially above prices quoted for foreign-produced mica. Thus, in effect, the domestic expansion program guarantees the domestic miners a market for specified grades of material at guaranteed subsidy prices. This domestic program is scheduled to expire on June 30, 1957. Under Defense Minerals Exploration Administration programs, many contracts for mica exploration and development have been signed.

At the same time intensified efforts were undertaken to expand procurement of foreign mica mainly in Brazil and India. However, there have been many obstacles confronting the production of mica in foreign countries, such as labor unrest, drastic increases in wages, inflation and fluctuations in the exchange value of foreign currencies.

In October 1954, the General Services Administration, at the request of the Office of Defense Mobilization, arranged with the Materials Advisory Board of the National Academy of Sciences to make a technical survey of the electrical and electronics industries to determine the lowest quality and grade of mica which can be used successfully and economically for strategic and critical purposes. The final report on this survey is expected soon.

In March 1955, at the suggestion of the Defense Mobilization Board, the Office of Defense Mobilization appointed two special committees, one on Mica Substitutes and one on Expansion of Foreign Mica Procurement. When substitutes are developed and when feasible means of enlarging deliveries of strategic mica from foreign sources have been developed, suitable implementing action will be taken promptly.

In April 1955, on the basis of a special report prepared by the Business and Defense Services Administration, the Special Committee on Mica Substitutes recognized the urgent need for further research and development work in the area of mica substitutes and alternate materials. As a result, the Office of Minerals Mobilization in the Department of the Interior started preparing a program for the acceleration and intensification of such research and development activities, by private industry as well as by responsible Government agencies.

One product of Bureau of Mines research into this problem has been the development of synthetic mica. A plant to produce this synthetic mica, now being built by a private company, is nearing completion. This company also plans extensive research to improve the quality of bonded mica products and to explore further the possibility of developing muscovite block and film substitutes. It is too early to predict the effects of these developments on the stockpile program.

In summary, the Government is taking positive steps to increase the rate of mica stockpiling and to attempt to reduce defense needs for muscovite quality mica. The resources of all affected departments and agencies, as well as the talents and facilities of private research organizations

and industry, are being integrated into this effort.

NICKEL

The shortage of nickel has been a continuing problem since the outbreak of Korean hostilities. Requirements for defense production rose to a peak in 1952 and still are very substantial. As a result availability for civilian use, after providing for defense, has been substantially less than demand in varying degrees up to the present time.

During the Korean war the world-wide shortage of nickel resulted in voluntary agreements among the nations on an equitable division of the total supply. In this country, distribution and end usage controls severely restricted consumption of nickel to only the most essential purposes, and reduced civilian consumption in 1951 through 1953 substantially below the pre-Korean average, notwithstanding increasing economic activity. During this time provision for essential civilian and defense requirements out of the available supply kept acquisitions for the stockpile at a dangerously low level.

The problem was essentially one of a relatively inelastic supply in the face of increasing demands, since capacity could not be readily enlarged. Nickel deposits are limited in number and generally require development of special processes and use of expensive plants designed to extract nickel from the respective ores. Consequently, new production involves a lead time of three to five years before substantial quantities can be forthcoming and many millions of dollars are necessary to finance such operations.

Starting in 1950 the Government embarked on an expansion program intended to develop feasible sources of supply. Under the Defense Production Act borrowing authority, production contracts, premium prices, grants for research and for building pilot plants and other forms of assistance were employed to increase the supply. Primarily as a result of these efforts, production in North America has been increased to date by about 125,000,000 pounds annual capacity. The program involves $720 million in gross transactions consisting mostly of sales to the Defense Production Act account, with a probable ultimate net cost of $160 million, taking into account the premiums to be paid over market prices, research and other expenses, and after deducting income from sales to the stockpile at market prices. Substantial new production did not commence, however, until the end of 1953 and this new output has been increasing since that time.

As declining defense needs in 1953 somewhat eased the deficit in civilian requirements, important segments of the nickel consuming industry with the support of the Department of Commerce urged elimination of all controls over nickel even though they recognized that the supply was still inadequate. They held that continuance of Government controls would not result in a distribution more effective, more equitable or more orderly than could be accomplished in an open market and that many hardships would be eased by this action. Careful consideration was given to this proposal by all defense agencies and it was finally agreed that termination of controls could be permitted after provision was made for priority filling of defense orders, for the establishment of a firm and substantial schedule of shipments to the stockpile derived for the most part from Government-sponsored projects, and for undertakings by major producers to distribute their supplies to industry equitably. When these arrangements were made, the Office of Defense Mobilization authorized the lifting of controls on November 1, 1953.

In 1954 the deficit in supply for civilian users was not serious. Also, stockpile acquisitions increased substantially as a result of the new expansion. However, in 1955 increasing defense requirements combined with expanded economic activity intensified supply difficulties for many users. In February 1955 the Department of Commerce urged making available to industry certain amounts of nickel scheduled for delivery to the Government in order to relieve the shortage situation. After consultation with the agencies concerned and upon the advice of the Defense Mobilization Board, seven million pounds were so released during the first six months of 1955. This quantity served to maintain civilian availabilities at about the 1954 level while delaying completion of the stockpile objective for only a short period of time. It was agreed that our improved security position resulting from expanded production and from large acquisitions for the stockpile over the intervening period could permit this action.

By June 1955 it became apparent that the earlier tight civilian supply conditions were continuing. Therefore, on recommendation of the Department of Commerce and after consultation with the Defense Mobilization Board, four million pounds were released for the third quarter of 1955. However, the rate of shipments to the stockpile deriving monthly from the Government's expansion program remains substantial. Meanwhile, over the near future additional new supplies will be forthcoming from Government-sponsored projects already under contract, which will ease our security position for this metal.

TIN

After World War II, there was a long period of rehabilitation of the tin production in the Far East which formerly had constituted the major source of supply for the world's tin. Since 1948, world production has exceeded consumption and the strategic stockpile of tin has steadily increased, at first aided by a system of controls carried over from World War II and later without the necessity of such controls.

During the Korean emergency, controls on tin were reimposed. By 1953 however, the need for these controls no longer existed and stockpile acquisitions continued at a high rate without them. Recently, the minimum objective has been achieved and by the end of fiscal year 1956 the stockpile will contain or have available sufficient tin metal to meet the long-term objective—enough to meet any foreseeable defense emergency.

The present level of world production of tin exceeds consumption and were it not for current and projected purchases of concentrates by the Government there would be a substantial surplus on the world market. This situation has been anticipated by the tin producing countries to whose economies this metal is of prime importance. Accordingly, an effort has been made to establish through an International Tin Agreement balanced production and "buffer stocks" to prevent drastic price fluctuations. The United States has not joined in this proposed agreement among producers and consuming countries.

The fulfillment of stockpile objectives brings to an end any defense justification for the continued operation of the Texas City Tin Smelter by the Government. It is unlikely that the United States will again be required for defense reasons to build and operate a tin smelter. However, should this condition arise, the present stockpile will provide for our national defense needs and leave adequate time to permit the building of a smelter more suited to our needs than the present facility.

There exists in the world today, exclusive of the Texas City Tin Smelter, adequate smelter capacity to meet the world's requirements for tin consumption. These smelters can process all of the tin ores and concentrates now being produced throughout the world, with a surplus of capacity over demand. Since no single country controls either the ore production or the major smelters, there will be continuing competition among the smelters for the ores and among the producers for the world markets. Under the circumstances, neither a world nor a United States shortage of tin appears likely.

In line with Senate Concurrent Resolution No. 26, a study will be made by the Executive Branch concerning the future disposition of the Texas City Tin Smelter and recommendations will be made to the Congress.

TITANIUM

Government progress in moving titanium from a laboratory proven material to direct military use has been substantial. Titanium sponge production has moved forward. With increasing sponge availability, industrial knowledge about new uses for this metal is growing rapidly. An interim stockpile goal for titanium has been established and the sponge expansion program is well under way.

From the year 1789 when titanium was discovered until 1940 when Wilhelm Kroll reported his now famous method of making ductile titanium metal, titanium as metal remained a laboratory curiosity. Industry and Government research efforts led to the first commercial production of two tons of titanium under the Kroll process in 1948. The attraction of titanium to the air weaponry of the country is its light weight, high temperature, strength and corrosion resistance. As aircraft go faster, a metal with good strength properties and capacity to withstand temperatures and corrosion is highly desirable.

Starting in 1938 the Bureau of Mines pioneered in production research on titanium. After their demonstration that duc-

tile titanium could be produced on a pilot-plant scale, the interest of industry was aroused. The world's first small-scale commercial production of ductile titanium metal was begun in 1948.

New titanium sponge production organizations were formed during the years 1950 to mid-1954. Titanium Metals Corporation of America, E. I. duPont de Nemours Company, Inc., Cramet, Inc., and Dow Chemical Company signed Government contracts for the production of titanium sponge metal by modifications of a magnesium reduction process. The Electro Metallurgical Company signed a Government contract for the production of titanium metal by a sodium-reduction method. By the spring of 1955, the Government had contracted to increase the total annual capacity of titanium sponge to 22,500 tons. The price of titanium sponge had dropped from $5 per pound in 1948 to $3.95 per pound in the spring of 1955.

The major problems remaining in titanium relate to cost and quality. The principal reason that titanium is difficult to melt is because it readily absorbs oxygen and nitrogen from the air, especially at high temperatures and if allowed to do this without proper controls, the metal becomes brittle and useless. The specialized equipment required employs safety features to prevent explosions in the production of titanium. Expensive reduction and ingot-melting processes must be carried out either in a vacuum, or under a protective blanket of inert gas such as helium or argon in order to prevent damage to the metal.

Since the metal has started to become available in quantity, tremendous strides are being made in learning how to fabricate and to produce parts and components for aircraft engines, airframes and other military material. As experience grows in processing this new metal into these engine and airframe parts, specifications are being evaluated to ascertain where titanium parts can most effectively be utilized. It is estimated that 3,000 tons of the 8,000 tons scheduled for production in 1955 will be used during the year.

Moving ahead steadily toward the goal of making maximum military usage of this metal, the Government has recently taken a number of steps forward:

1. It has been working closely with the Materials Advisory Board of the National Research Council to coordinate the development and research activities of Government and industry.

2. In addition the Department of Defense has established a Titanium Metallurgical Laboratory. This laboratory is working directly with the airframe and engine companies on the solution of difficulties encountered in using titanium in production.

3. The Department of Defense has established a 6-point program of support for titanium processing as follows: (a) expanded research program, (b) development of improved melting and fabricating methods and equipment, (c) experimental fabrication and testing of titanium components, (d) experimental fabrication of titanium into military components, (e) encouragement of useful applications of titanium in production aircraft, and (f) provision for use of titanium in selected military applications other than aircraft.

4. With increasing knowledge on application of the material, it has been possible to refine and improve the specifications. Early in 1955 the judgment of the Materials Advisory Board, National Research Council, was requested in an evaluation of available technical evidence as to the desirable specifications of titanium sponge to be purchased by the Government. Their report entitled "Titanium Sponge Quality and Its Relationship to the Properties of Titanium Products" was issued on June 30, 1955.

In January 1951 the Government initiated its titanium-expansion program based on an evaluation of military requirements. Because of the high plant cost, high operating cost, limited civilian applications and the possibility of obsolescence, the Government provided the following techniques to assist industry with the expansion program: (1) procurement contracts, (2) advances against production, (3) rapid tax amortization, (4) purchases of excess supply for a temporary Government revolving fund inventory, (5) loans for pilot plants, and (6) demonstration to contractors of production techniques at the Bureau of Mines pilot plant in Boulder City, Nevada.

Stockpiling of titanium is based on an interim objective. Government reserves of titanium are kept in DPA accounts to permit greater flexibility in managing these reserves. Should new applications develop or current demands substantially increase, these materials could be released to fill immediate needs. The objective is to main-

tain a proper balance of production and requirements in a new industry. In order to be on the safe side since titanium gives such promise of value for military uses, the Government has expanded sponge production beyond current requirements. Because of the continued spread between production and requirements, a moratorium was declared in April 1955 on new sponge production contracts.

A few years ago titanium started as a laboratory idea and technique. Substantial tonnages are now being used. The principal immediate problems ahead are improving fabrication and reducing costs. In view of the progress made to date and the continuing efforts of Government agencies and industry, the major remaining problems should be overcome in the next few years, with a decline in Government assistance as industrial knowledge and interest increases.

DEVELOPMENTS IN OTHER MATERIALS

Asbestos

The Bureau of Mines has taken several steps to improve the asbestos situation. It published a report on the asbestos deposits of Arizona—a source of strategic grade chrysotile. Research on the synthesis of asbestiform fibers continued in Bureau laboratories. An examination was made of an asbestos operation in Venezuela to evaluate it as a source of strategic chrysotile. An area of asbestos outcrops in Maine was explored.

Bauxite

The Bureau of Mines has extended its research in the use of replacements for high-grade bauxite. Beneficiation tests were made on bauxite and alumina; the lime-soda sintering process for treating low-grade ores and alumina plant residues received further laboratory investigation, and a wide range of aluminum-silicon alloys was produced by smelting aluminum silicate raw materials with carbonaceous reductants in an electric arc furnace.

Bristles, Hog

Research on, and development of, substitutes for hog bristles have made substantial progress. Synthetics and bristle filament from regenerated chicken feathers appear to be satisfactory substitutes for most bristle uses.

Castor Oil

Investigation by the Emergency Procurement Service indicates that the castor oil in the stockpile seems to be very stable and shows no significant deterioration. The relocation of castor oil from west coast commercial facilities into east coast Government tank farms in the interests of moving them close to points of consumption is well under way.

As a result of research by the Agricultural Research Service, a new castor bean variety named "Custer" was released in the spring of 1955. It is now being grown on approximately 1,000 acres. "Custer" gives good yields and is resistant to shattering.

Chromite, Refractory Grade

Drilling by the Geological Survey in Cuba indicates the presence of deposits of refractory-grade chromite. The Bureau of Mines undertook a program designed to determine the extent to which domestic chrome ores and foreign ores not now used could be used in refractory production.

Coconut Oil

Coconut oil was also being transferred from west coast storage to east coast Government tank farms by sale of west coast inventories and purchase under rotation of oils of lower fatty acid content. Evaluation of preliminary studies of refined coconut oil suggests that it may have greater stability in storage than crude oil. This research is being continued by the Emergency Procurement Service.

Columbite-Tantalite

The purchase program under Defense Production Act expansion for columbite-tantalite ores and concentrates has been completed nearly 18 months ahead of the anticipated termination date because of the unprecedented large supply of this material stimulated by the prices offered in the program. Availability of columbium for the stockpile from this program will make further purchases toward the present objective unnecessary.

A large deposit of columbium—bearing mineral is being developed in Idaho with

the assistance of a Government contract, and two additional deposits have been discovered in Canada. Thus, our dependence on overseas sources has been greatly reduced.

Cordage Fibers, Abaca and Sisal

Intensive study was given to the level of operation of the Government's Central American abaca plantations, with the result that acreage in production has been reduced without adversely affecting national security. Research and development have continued with the fiber crops and special emphasis is being given to sansevieria by the Agricultural Research Service. Man-made fibers are also being evaluated.

The Emergency Procurement Service, working on a cooperative program with industry, has initiated a research program into long-time storage of abaca and sisal. Under this program manufacturers work with the oldest fiber in storage to determine the effect, if any, of stored fiber on their product and the extent of changes in this fiber. Abaca and sisal are being rotated.

Feathers and Down, Waterfowl

Research into substitutes and extenders is progressing rapidly; however, the extent of their suitability for military uses has not yet been fully determined. Modified chicken feathers can serve some uses and possibly help as extenders, and a synthetic fiber of domestic origin, which has received wide public acceptance as a filling material in civilian pillows and sleeping bags, is undergoing military tests.

Fluorspar

The problem of maintaining the domestic production component of the metallurgical fluorspar mobilization base received attention throughout the year. Limited stockpile purchases of domestically produced material were made at prices permissible under the Buy American Executive Order.

Iodine

A review of the stockpile objective, completed this spring, indicated the need for additional purchases, which have been resumed.

Magnesium

The Bureau of Mines has developed basic information for production of a wider range of magnesium alloys. Domestic output in the first half of 1955 was at a lower rate than in any year since 1951.

Palm Oil

An appraisal of the general condition of palm oil in the stockpile indicates that most of it is suitable for further storage, while some oil should be made available for early use. Since a substantial part of this stockpiled oil will be disposed of as surplus to stockpile needs, the removal of the high acid oil will result in retaining an oil of high quality.

On June 12, 1955, the Emergency Procurement Service announced in the Federal Register plans for the future disposal of 30,000,000 pounds in addition to the earlier program of 11,000,000 pounds. The disposal program is the outgrowth of recommendations from an industry advisory committee. The steel industry has accelerated its participation in the utilization of Government oil so that the disposal of the surplus in the stockpile may be completed in a few years.

Platinum Group Metals

Facilities for producing platinum group metals have been expanded in the two countries that are the principal free world producers of these metals, resulting in increased supply and lower prices for most metals in this group during the first half of 1955.

Pyrethrum

A complete analysis by the Emergency Procurement Service of the stockpiled pyrethrum shows it to be of a high quality after prolonged storage. Although preliminary tests seemed to show evidence of decreasing strength, more complete analyses show no significant decrease in insect killing power or in pyrethrins content.

As a result of a reduction in the pyrethrum objective, meetings were held with the industry to develop a satisfactory disposal program. Initial disposal of 60,000 pounds of pyrethrum extract from the stockpile will start in November 1955 with full industry participation.

Quinine

Totaquine from the quinine stockpile inventory will be sold from stockpile surpluses beginning in November 1955, as indi-

cated by the announcement in the Federal Register on April 30, 1955.

Shellac

The first rotation of shellac occurred during the reporting period with the removal of some low quality stocks. Removal of low-grade shellac from the stockpile will continue.

Selenium

The shortage of selenium continued to be critical, and the search for new sources has been intensified and accelerated by industry and Government agencies. Various new sources of this badly needed metal have previously been investigated without much hope of commercially feasible production. Recent new discoveries of uranium ore accompanied by a relatively high content of selenium offer possibilities for by-product production of selenium within the next two or three years, and these will be thoroughly investigated in the coming months. Metallurgical research on the extraction of selenium from other new sources has also been expanded. The purchase of high-purity grade selenium in addition to commercial grade selenium for the stockpile has been authorized.

Silicon Carbide, Crude

Crude silicon carbide was added to the List of Strategic and Critical Materials for stockpile procurement during this six months. Purchases have been started toward filling the minimum objective, and no difficulty is expected in obtaining the desired quantities.

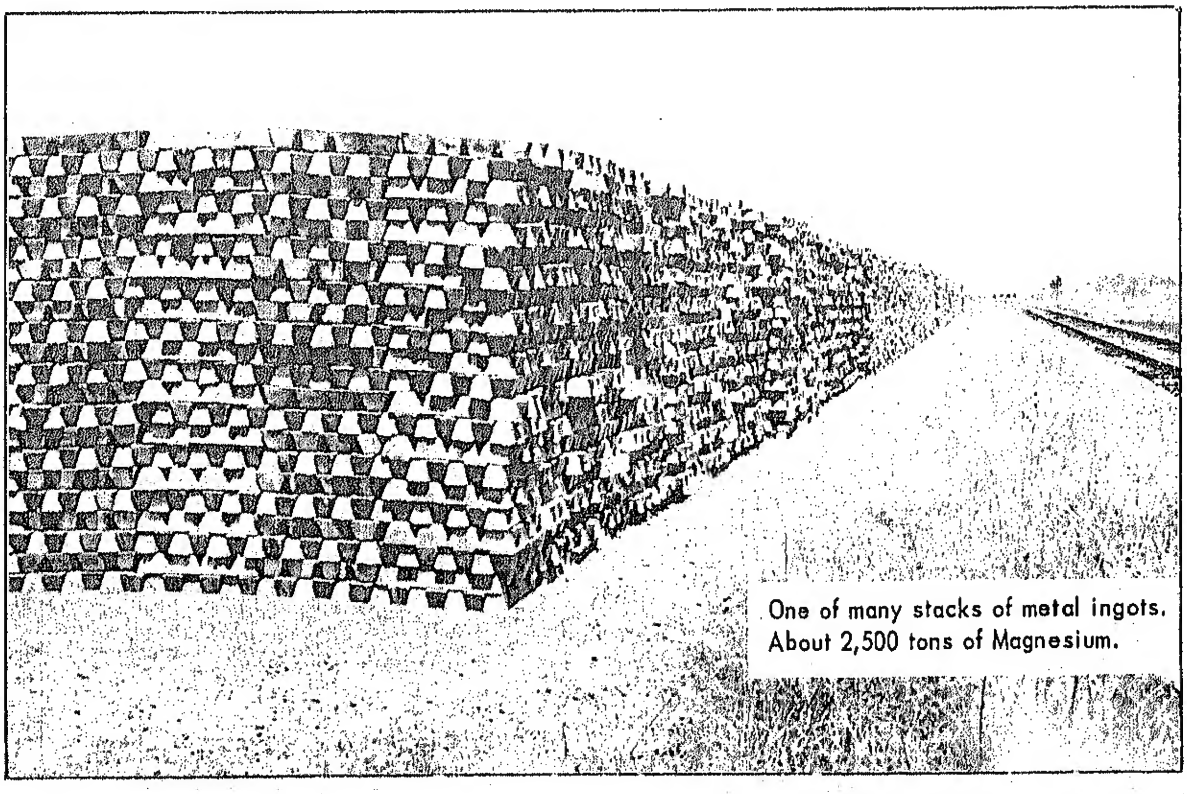
Silk

Research and development have progressed to the extent that synthetic fibers have been accepted as substitutes for silk in many military items. Progress has also been made in the development and processing of natural vegetable fibers as substitutes for certain silk military uses.

Tantalite (See Columbite)

Vegetable Tannins

The Agricultural Research Service pilot plant equipment for extracting the tannins from canaigre root is kept available for the evaluation of the yield and quality of tannin in the new varieties of canaigre now under development.



One of many stacks of metal ingots. About 2,500 tons of Magnesium.

APPENDIX A

FINANCIAL SUMMARY OF STOCKPILE OPERATIONS, AS OF JUNE 30, 1955

Table 1 STATUS OF OBLIGATIONAL OPERATIONS, AS OF JUNE 30, 1955

Authority	Appropriated Funds a/	Authorizations for: Making Advance Contracts b/	Authorizations for: Liquidating Outstanding Advance Contracts c/	Total Obligational Authority (Cumulative) d/
Under PL 117 - 76th Congress				
PL 361 - 76th Congress, August 9, 1939	$ 10,000,000	$	$	$ 10,000,000
PL 442 - 76th Congress, March 25, 1940	12,500,000			22,500,000
PL 667 - 76th Congress, June 26, 1940	47,500,000			70,000,000 e/
Under PL 520 - 79th Congress				
PL 663 - 79th Congress, August 8, 1946	100,000,000	-	-	100,000,000
PL 271 - 80th Congress, July 30, 1947	100,000,000	75,000,000	-	275,000,000
PL 785 - 80th Congress, June 25, 1948	225,000,000	300,000,000	-	800,000,000
PL 785 - 80th Congress, June 25, 1948	75,000,000	-	75,000,000	800,000,000
PL 119 - 81st Congress, June 23, 1949	40,000,000	270,000,000	-	1,110,000,000
PL 150 - 81st Congress, June 30, 1949	275,000,000	250,000,000	-	1,635,000,000
PL 150 - 81st Congress, June 30, 1949	250,000,000	-	250,000,000	1,635,000,000
PL 434 - 81st Congress, October 29, 1949	-	-	100,000,000 f/	1,535,000,000
PL 759 - 81st Congress, September 6, 1950	365,000,000	-	240,000,000	1,660,000,000
PL 759 - 81st Congress, September 6, 1950	240,000,000	125,000,000	-	2,025,000,000
PL 843 - 81st Congress, September 27, 1950	573,232,449 g/	-	-	2,598,232,449
PL 911 - 81st Congress, January 6, 1951	1,834,911,000	-	-	4,433,143,449
PL 253 - 82nd Congress, November 1, 1951	590,216,500	-	-	5,023,359,949
PL 253 - 82nd Congress, November 1, 1951	200,000,000	-	200,000,000	5,023,359,949
PL 455 - 82nd Congress, July 25, 1952	203,979,000	-	70,000,000	5,157,338,949
PL 176 - 83rd Congress, July 31, 1953	-	-	30,000,000	5,127,338,949
PL 428 - 83rd Congress, June 24, 1954	-	-	27,600,000	5,099,738,949
PL 663 - 83rd Congress, August 26, 1954	379,952,000 h/	-	-	5,479,690,949
Total PL 520	5,452,290,949 i/	1,020,000,000	992,600,000	5,479,690,949
TOTAL PL 117 and PL 520	5,522,290,949 i/	1,020,000,000	992,600,000	5,549,690,949

a/ Congressional appropriations of funds for stockpiling purposes.
b/ Congressional appropriations of contracting authority for stockpiling purposes in advance of appropriation of funds.
c/ Congressional authorizations to liquidate outstanding obligations incurred under previously granted advance contract authority.
d/ Cumulative total of appropriated funds and advance contract authorizations, less authorizations to liquidate outstanding advance contracts.
e/ Excludes $8,845,792 received from sale of stockpile materials for wartime consumption. Receipts were returned to Treasury February 1948.
f/ Cancellation of previously authorized authority to make contracts.
g/ Excludes $25,404,921 transferred to operating expenses for rehabilitation of Government-owned material producing plants.
h/ Excludes $48,000 transferred to Public Utilities Division, C.S.A.
i/ Excludes receipts from rotational sales.

Table 2 TOTAL OBLIGATIONS AND EXPENDITURES OF STOCKPILING FUNDS

CUMULATIVE AND BY FISCAL PERIOD, THROUGH JUNE 30, 1955

Fiscal Period	Obligations Incurred a/		Expenditures b/	
	Net Change By Fiscal Period	Cumulative as of End of Period	By Fiscal Period	Cumulative as of End of Period
Prior to Fiscal Year 1947	$ 54,983,152	$ 54,983,152	$ 54,970,732	$ 54,970,732
Fiscal Year 1947	68,888,533	123,871,685	11,359,999	66,330,731
Fiscal Year 1948	252,901,411	376,773,096	82,907,575	149,238,306
Fiscal Year 1949	459,766,881	836,539,977	304,486,177	453,724,483
Fiscal Year 1950	680,427,821	1,516,967,798	440,834,970	894,559,453
Fiscal Year 1951	2,075,317,099	3,592,284,897	655,537,199	1,550,096,652
Fiscal Year 1952	948,117,547	4,540,402,444	844,682,459	2,394,780,111
Fiscal Year 1953	252,375,163	4,792,777,607	906,158,850	3,300,938,961
Fiscal Year 1954	116,586,681	4,909,364,288	644,760,321	3,945,699,282
Fiscal Year 1955	321,799,951	5,231,164,239	801,310,212	4,747,009,494

a/ Figures are the sum of obligations incurred under PL 520, 79th Congress and PL 117, 76th Congress. Final obligations under PL 117, 76th Congress were incurred in Fiscal Year 1949.

b/ Figures are the sum of expenditures under PL 520, 79th Congress and PL 117, 76th Congress. Final expenditures under PL 117, 76th Congress were made in Fiscal Year 1951.

Table 3 EXPENDITURE OF STOCKPILE FUNDS, BY TYPE – CUMULATIVE AND FOR FISCAL YEAR 1955

Source of Funds and Type of Expenditure	Cumulative through a/ June 30, 1954	Fiscal Year 1955	Cumulative through a/ June 30, 1955
Expenditures			
Gross Total	$4,218,094,216	$850,336,666	$5,068,430,882
Less: Adjustment for Receipts from Rotation Sales	272,394,934	49,026,454	321,421,388
Net Total	3,945,699,282	801,310,212	4,747,009,494
Material Acquisition Costs, Total	3,703,651,023	774,313,780	4,477,964,803
Material Purchases	3,556,027,347	759,373,675	4,315,401,022
Accessorial Costs	147,623,676	14,940,105	162,563,781
Stockpile Maintenance Costs, Total	216,875,391	25,393,919	242,269,310
Facility Construction	42,833,494	1,223,415	44,056,909
Care, Handling and Processing of Transferred Materials	60,971,979	826,815	61,798,794
Other Storage and Handling Charges	89,242,524	21,387,843	110,630,367
Research and Experimental Work	18,588	884	19,472
Net Rotation Costs	23,808,806	1,954,962	25,763,768
Administrative Costs, Total	25,172,868	1,602,513	26,775,381
Emergency Procurement Service	24,873,029	1,520,729	26,393,758
Other	299,839	81,784	381,623

a/ Cumulative figures are the total of expenditures under PL 117, 76th Congress and PL 520, 79th Congress. Expenditures under PL 117, 76th Congress totaled $70,000,000, of which $55,625,237 was for materials acquisition costs and $14,374,763 was for other costs. Final expenditures under PL 117 were made in FY 1951.

APPENDIX B

LIST OF STOCKPILE MATERIALS

August 15, 1955

The materials listed below are currently included in the stockpiling program. Not all of the materials are under active procurement.

GROUP I MATERIALS

The materials listed in this section constitute Group I and have been or may be acquired through purchase pursuant to Section 3(a) and by transfer of Government-owned surpluses pursuant Section 6(a) of Public Law 520, 79th Congress.

1. Abrasives, Crude Aluminum Oxide
2. Agar*
3. Aluminum
4. Antimony
5. Asbestos, Amosite
6. Asbestos, Chrysotile
7. Asbestos, Crocidolite
8. Bauxite, Metal Grade
9. Bauxite, Refractory Grade
10. Beryl
11. Bismuth
12. Bristles, Hog
13. Cadmium
14. Castor Oil
15. Celestite
16. Chromite, Chemical Grade
17. Chromite, Metallurgical Grade
18. Chromite, Refractory Grade
19. Cobalt
20. Coconut Oil
21. Columbite
22. Copper
23. Cordage Fibers, Abaca
24. Cordage Fibers, Sisal
25. Corundum
26. Cotton, Extra Long Staple
27. Diamonds, Industrial
28. Feathers and Down, Waterfowl
29. Fluorspar, Acid Grade
30. Fluorspar, Metallurgical Grade
31. Graphite, Ceylon—Crystalline and Amorphous
32. Graphite, Madagascar—Crystalline Flake and Fines
33. Graphite, other than Ceylon and Madagascar—Crystalline
34. Hyoscine
35. Iodine
36. Jewel Bearings, Instrument Jewel except Vee Jewels
37. Jewel Bearings, Sapphire and Ruby Vee Jewels
38. Jewel Bearings, Watch and Timekeeping Device Jewels
39. Lead
40. Magnesium
41. Manganese Ore, Battery Grade
42. Manganese Ore, Chemical Grade
43. Manganese Ore, Metallurgical Grade
44. Mercury
45. Mica, Muscovite Block, Stained and Better
46. Mica, Muscovite Film, First and Second Qualities
47. Mica, Muscovite Splittings
48. Mica, Phlogopite Splittings
49. Molybdenum
50. Nickel
51. Opium
52. Palm Oil
53. Platinum Group Metals, Iridium
54. Platinum Group Metals, Platinum
55. Pyrethrum
56. Quartz Crystals
57. Quinidine
58. Rare Earths
59. Rubber, Crude Natural
60. Sapphire and Ruby
61. Selenium
62. Shellac
63. Silicon Carbide, Crude
64. Silk, Raw
65. Silk Waste and Noils
66. Sperm Oil
67. Talc, Steatite, Block
68. Tantalite
69. Tin
70. Titanium Sponge
71. Tungsten
72. Vanadium
73. Vegetable Tannin Extract, Chestnut
74. Vegetable Tannin Extract, Quebracho
75. Vegetable Tannin Extract, Wattle
76. Zinc

GROUP II MATERIALS

The materials listed in this section have been acquired principally through transfer of Government-owned surpluses pursuant to Section 6(a) of Public Law 520, 79th Congress, and constitute Group II. None is under procurement.

1. Bauxite, Abrasive
2. Cryolite, Natural
3. Diamond Dies
4. Mica, Muscovite Block, Stained and Lower
5. Mica, Phlogopite Block
6. Optical Glass
7. Platinum Group Metals, Osmium
8. Platinum Group Metals, Palladium
9. Platinum Group Metals, Rhodium
10. Platinum Group Metals, Ruthenium
11. Rutile
12. Talc, Steatite, Ground
13. Wool
14. Zirconium Ore, Baddeleyite
15. Zirconium Ore, Zircon

*Transferred from Group II, July 1955.

APPENDIX C

REPORTS AND MAPS ISSUED BY THE U. S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR, JANUARY—JUNE 1955

Reports

Professional Paper 261, Rare-earth mineral deposits of the Mountain Pass district, San Bernardino County, California.

Professional Paper 265, Geology of the Quartz Creek pegmatite district, Gunnison County, Colorado.

Bulletin 999, Annotated bibliography of the bauxite deposits of the world.

Bulletin 1000-C, A Paleozoic geochemical anomaly near Jerome, Arizona (Copper-zinc).

Bulletin 1008, Geology and mineral deposits of the James River-Roanoke River manganese district, Virginia.

Bulletin 1010, Geologic controls of lead and zinc deposits in Goodsprings district, Nevada.

Bulletin 1011, Pegmatites of the Crystal Mountain district, Larimer County, Colorado.

Bulletin 1012-A, B, C, D, E, F, Fluorspar deposits in western Kentucky.

Bulletin 1015-C, Geology of the High Climb pegmatites, Custer County, South Dakota.

Bulletin 1027-A, Physical stratigraphy of the Phosphoria in part of southwestern Montana.

Published Geologic Quadrangle Maps

Map GQ 52, Bedrock geology of the Lake Medora quadrangle, Michigan (Copper).

Map GQ 54, Bedrock geology of the Mohawk quadrangle, Michigan (Copper).

Maps and Reports Placed on Open File for Public Inspection

Geologic maps and sections of the Nevada Scheelite mine, Regent district, Mineral County, Nevada.

Surface and underground geologic map and sections of the Red Devil mine, Sleetmute area, central Kuskokwim region, Alaska (Mercury).

Surface and underground geologic map of the DeCourcy Mountain mine, DeCourcy Mountain area, central Kuskokwim region, Alaska (Mercury).

Cowboy tungsten property, Pine Grove Hills, Pershing County, Nevada.

Geologic map of the Ord quicksilver area, Matzatzal Mountains, Arizona.

Geochemical exploration for antimony in southeastern Alaska.

Geology of two areas of pegmatite deposits in southeastern Alaska.

Potash occurrences in the U. S.

Physical stratigraphy of the Phosphoria formation in northwestern Wyoming.

Pegmatites of the Middletown area, Connecticut.

Geologic maps and sections of the Helen Beryl, Elkhorn, and Tin Mountain pegmatites mines, South Dakota.

GPO 898489